1. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

   Pringles wants to add 23 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

   A. About 11 percent

   B. About 3 percent

   C. About 12 percent

   D. About 7 percent

   E. None of the above

---

2. Solve the modeling problem below, if possible.

   In CHM2045L, Brittany created a 18 liter 10 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 5 percent and 28 percent solutions, what was the amount she used of the 5 percent solution?

   A. $3.91 liters$

   B. $9.00 liters$

   C. $9.48 liters$

   D. $14.09 liters$

   E. There is not enough information to solve the problem.

---

3. Solve the modeling problem below, if possible.

   A new virus is spreading throughout the world. There were initially 8 many cases reported, but the number of confirmed cases has doubled

every 5 days. How long will it be until there are at least 1000000 confirmed cases?

A. About 25 days

B. About 85 days

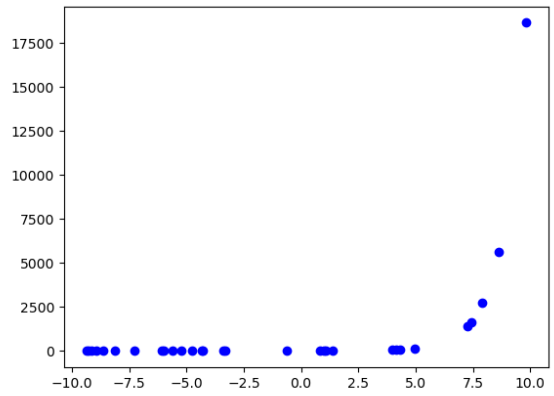
C. About 23 days

D. About 59 days

E. There is not enough information to solve the problem.

---

4. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Exponential model

C. Non-linear Power model

D. Linear model

E. None of the above

---

5. For the information provided below, construct a linear model that describes her total costs, C, as a function of the number of months, x she is at UF.

Aubrey is a college student going into her first year at UF. She will

receive Bright Futures, which covers her tuition plus a \$1000 educational expense each year. Before college, Aubrey saved up \$5000. She knows she will need to pay \$800 in rent a month, \$60 for food a week, and \$32 in other weekly expenses.

A. $C(x) = 1168$

B. $C(x) = 892x$

C. $C(x) = 1168x$

D. $C(x) = 892$

E. None of the above.

---

6. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 30 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

A. About 14 percent

B. About 15 percent

C. About 9 percent

D. About 3 percent

E. None of the above

---

7. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 26 liter 44 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 15 percent and 45 percent solutions, what was the amount she used of the 45 percent solution?

A. $0.87 liters$

B. $13.00 liters$

C. $25.13 liters$

D. $14.84 liters$

E. There is not enough information to solve the problem.

---

8. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 3 many cases reported, but the number of confirmed cases has tripled every 5 days. How long will it be until there are at least 10000 confirmed cases?

A. About 41 days

B. About 21 days

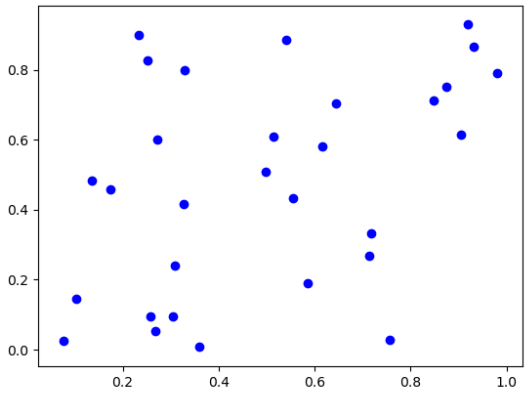
C. About 22 days

D. About 37 days

E. There is not enough information to solve the problem.

---

9. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Linear model

C. Exponential model

D. Non-linear Power model

E. None of the above

---

10. For the information provided below, construct a linear model that describes her total budget, B, as a function of the number of months, x she is at UF.

Aubrey is a college student going into her first year at UF. She will receive Bright Futures, which covers her tuition plus a $800 educational expense each year. Before college, Aubrey saved up $5000. She knows she will need to pay $800 in rent a month, $80 for food a week, and $48 in other weekly expenses.

A. $B(x) = 4488x$

B. $B(x) = 4872x$

C. $B(x) = 5800 - 928x$

D. $B(x) = 5800 - 1312x$

E. None of the above.

---

11. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 27 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

A. About 13 percent

B. About 14 percent

C. About 3 percent

D. About 8 percent

E. None of the above

---

12. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 22 liter 21 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 6 percent and 22 percent solutions, what was the amount she used of the 22 percent solution?

A. $11.00 liters$

B. $20.62 liters$

C. $4.92 liters$

D. $1.38 liters$

E. There is not enough information to solve the problem.

---

13. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 3 many cases reported, but the number of confirmed cases has tripled every 5 days. How long will it be until there are at least 1000 confirmed cases?

A. About 17 days

B. About 27 days

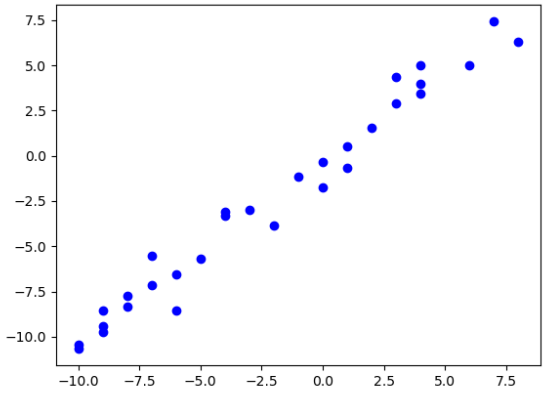
C. About 16 days

D. About 30 days

E. There is not enough information to solve the problem.

---

14. Determine the appropriate model for the graph of points below.



A. Linear model

B. Non-linear Power model

C. Exponential model

D. Logarithmic model

E. None of the above

---

15. For the scenario below, model the rate of vibration (cm/s) of the string in terms of the length of the string. Then determine the variation constant k of the model (if possible). The constant should be in terms of cm and s.

The rate of vibration of a string under constant tension varies based on the type of string and the length of the string. The rate of vibration of string ω decreases as the square length of the string increases. For example, when string ω is 2 mm long, the rate of vibration is 21 cm/s.

A. $k = 5.25$

B. $k = 84.00$

C. $k = 0.84$

D. $k = 525.00$

E. None of the above.

---

16. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 36 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

A. About 17 percent

B. About 3 percent

C. About 18 percent

D. About 11 percent

E. None of the above

---

17. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 29 liter 22 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 20 percent and 37 percent solutions, what was the amount she used of the 20 percent solution?

A. $4.25 liters$

B. $14.50 liters$

C. $25.59 liters$

D. $3.41 liters$

E. There is not enough information to solve the problem.

---

18. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 4 many cases reported, but the number of confirmed cases has doubled

every 4 days. How long will it be until there are at least 1000 confirmed cases?

A. About 12 days

B. About 14 days

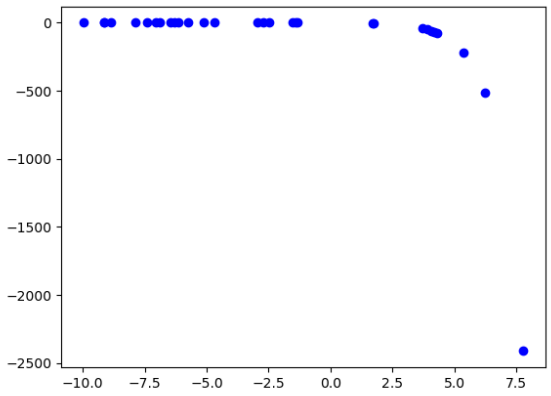
C. About 23 days

D. About 32 days

E. There is not enough information to solve the problem.

---

19. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Exponential model

C. Linear model

D. Logarithmic model

E. None of the above

---

20. For the information below, construct a linear model that describes the total time T spent on the path in terms of the distance of a particular part of the path *if we know that all parts of the path are equal length.*

A bicyclist is training for a race on a hilly path. Their bike keeps

track of their speed at any time, but not the distance traveled. Their speed traveling up a hill is 5 mph, 10 mph when traveling down a hill, and 8 mph when traveling along a flat portion.

A. $400.000D$

B. $0.425D$

C. $23.000D$

D. The model can be found with the information provided, but isn't options 1-3

E. The model cannot be found with the information provided.

---

21. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 38 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

A. About 11 percent

B. About 3 percent

C. About 19 percent

D. About 17 percent

E. None of the above

---

22. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 23 liter 29 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 15 percent and 37 percent solutions, what was the amount she used of the 15 percent solution?

A. $14.64 liters$

B. $10.14 liters$

C. $11.50 liters$

D. $8.36 liters$

E. There is not enough information to solve the problem.

---

23. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 4 many cases reported, but the number of confirmed cases has doubled every 1 days. How long will it be until there are at least 100000 confirmed cases?

A. About 15 days

B. About 5 days

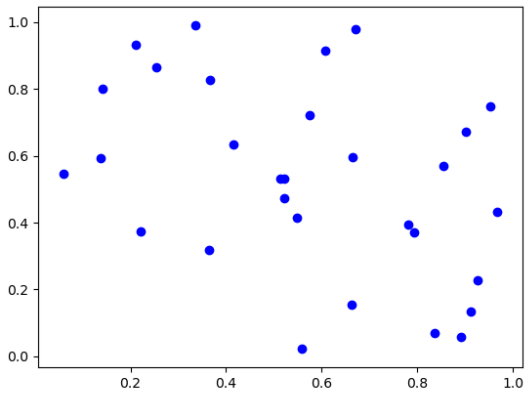
C. About 11 days

D. About 6 days

E. There is not enough information to solve the problem.

---

24. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Linear model

C. Logarithmic model

D. Exponential model

E. None of the above

---

25. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 180° *C and is placed into a* 17° *C bath to cool. After 30 minutes, the uranium has cooled to* 116° *C.*

A. $k = -0.02473$

B. $k = -0.01993$

C. $k = -0.02514$

D. $k = -0.01662$

E. None of the above

---

26. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 27 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

A. About 13 percent

B. About 8 percent

C. About 9 percent

D. About 14 percent

E. None of the above

---

27. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 15 liter 15 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 7 percent and 37 percent solutions, what was the amount she used of the 37 percent solution?

A. $7.50 liters$

B. $11.00 liters$

C. $5.62 liters$

D. $4.00 liters$

E. There is not enough information to solve the problem.

---

28. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 5 many cases reported, but the number of confirmed cases has doubled every 2 days. How long will it be until there are at least 1000000 confirmed cases?

A. About 36 days

B. About 12 days

C. About 11 days

D. About 25 days

E. There is not enough information to solve the problem.

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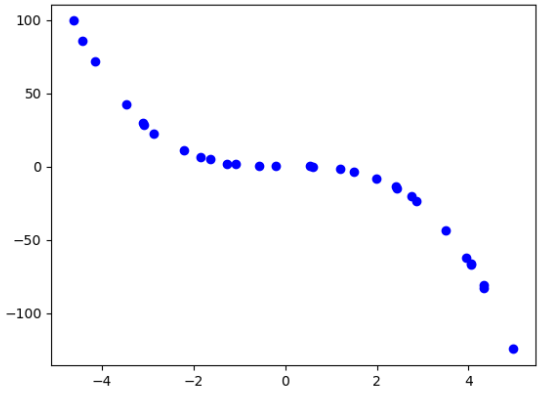
29. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Non-linear Power model

C. Logarithmic model

D. Linear model

E. None of the above

---

30. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$ to find the coefficient for the model of the new volume $V_{\text{new}} = kr^2 h$.

Pepsi wants to increase the volume of soda in their cans. They've decided to decrease the radius by 15 percent and decrease the height by 14 percent. They want to model the new volume based on the radius and height of the original cans.

A. $k = 0.62135$

B. $k = 0.00315$

C. $k = 1.95203$

D. $k = 0.00990$

E. None of the above.
